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TECHNOLOGY DEPT

SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE • JANUARY 12, 1946



Germ Warriors
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BIOLOGY-MEDICINE

Disease Warfare Not New

Disease has played a decisive part in many wars, though "germs" have not been used as intentional weapons on any considerable scale.

► THE IDEA of the use of biologic or bacterial agents in warfare is not new. Major use of "germs" as intentional weapons of war has not yet occurred on any considerable scale, yet disease has played a decisive part in many wars.

Up until the 20th century epidemic disease during war has always produced more military casualties than the missiles of the enemy.

The use of organisms that cause communicable diseases as an instrument of warfare was considered by the Conference on the Limitation of Armaments held in Washington in 1922. A commission that numbered among its members the American physiologist, Dr. Walter B. Cannon, who died only a few months ago, reported to the League of Nations that the effects of bacterial injury cannot be limited or localized, modern water purification methods protect against the organisms of typhoid and cholera, plague is a disease that would be as dangerous for the force using the organisms as for the attacked, danger from typhoid has been exaggerated, and modern sanitary methods are effective in controlling communicable diseases.

Doubtless with the biological warfare researches announced by the War Department, such conclusions are outdated. Bigger and better diseases have been found, no doubt, and counter measures developed.

Opinion in the era between the two World Wars was that bacterial warfare, like gas warfare, would not be a very effective weapon. There were "practically insurmountable technical difficulties." Perhaps with the new researches this is no longer true, and the mere fact that biological warfare was not used in actual combat may be no indication that it could not be used with effect.

Bacterial warfare was on the hush-hush list of the U. S. censorship codes of World War II and there were only a few breaks or mentions of the subject.

An article that was originally published in the *Military Surgeon* for March, 1933, written by the then Maj. Leon A. Fox, MC., U. S. Army, who is now a general, was reprinted by that journal and several other medical, scientific or technical journals in 1942 and

1943, just when the secret biological warfare researches were getting well under way. This caused a flurry of germ warfare publicity, which gave military and censorship authorities some unhappy moments.

Surgeon General Thomas Parran of the U. S. Public Health Service, at the Conference of Mayors in 1942, warned that, in his opinion, the enemy had planned and would use bacteriological warfare wherever possible.

A book titled "Japan's Secret Weapon," written by Barclay Newman and published in 1944 by Current Publishing Company, New York, called disease warfare Japan's "new jiu-jitsu in the death grapple of nations." It had among chapter headings: Spirochete warfare, black fever or kala-azar, tsutsugamushi fever, black death or Ohara's disease, leprosy as a weapon, fungus warfare, Japanese encephalitis, cancer-causing chemicals, miyagawa cocktail, amok, "American sleeping sickness".

The Japanese were charged in June, 1942, by Dr. P. Z. King, director of the Chinese National Health Administration, with using Chinese people as guinea pigs to test the effectiveness of bacteriological warfare. Other news reports from time to time charged use of germs in war against China to the Japanese.

The next war will be waged with disease germs and their toxins, weapons more devastating than atomic bombs and easier to develop, Maj. Gen. G. B. Chisholm, deputy minister of National Health and Welfare of Canada, and director general of medical services of the Canadian Army, warned in an address prepared for delivery on Oct. 23 of last year before the William Alanson White Psychiatric Foundation at Washington. This portion of the address was not actually delivered.

Gen. Chisholm said:

"While the atomic bomb has been a dramatic weapon in the closing phases of the recent war other almost completely developed weapons are still more terrible.

"What of an invasion of a country by a few thousand immunized tourists loaded with anthrax or the toxin of botulinus or typhoid or influenza or per-

haps some new bacteria or filterable virus especially developed for the purpose, or the spreading of such materials by planes without warning?"

"Any country could be paralyzed and destroyed at leisure by a well-organized attack of this type—and without any development of heavy industries.

"Let us all be prepared not for the last war with navies and armies and air forces, but for the next war with rockets and atomic bombs and bacteria and toxins.

"These are the weapons of the future and with them the whole world can be reached from any place on the earth in a few minutes.

"The people who definitely do not want to fight any more wars must promise total annihilation to any nation which starts to fight and must be prepared immediately and ruthlessly to carry out that promise without parley or negotiation. This involves the continual upkeep of widely dispersed atomic rocket stations covering the whole world and a continual high pressure research program to discover ever more efficient methods of killing to keep ahead of any possible competition.

"This must go on until we, all the people, are re-educated to be able to live in peace together, until we are free to think and behave sensibly."

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BIOLOGY-MEDICINE

Biological Warfare Technical Advisers Named

See Front Cover

► THE PICTURE on the front cover of this *SCIENCE NEWS LETTER* shows a group of biological warfare technical advisers (left to right): Dr. Ira L. Baldwin, present Dean of University of Wisconsin; Capt. N. S. Prime, USN, Commanding Officer of Naval detachment at Camp Detrick, Md., and also Chief of Ordnance for Biological Warfare development; Brig. Gen. W. A. Borden, USA, Chief of New Developments Division, War Department Special Staff. Mr. George Merck (President of Merck Chemical Co.), Special Consultant to the Secretary of War on Biological Warfare; Rear Admiral Julius Furer, USN; Commander W. B. Sarles (Asst. to President, U. of Wisconsin), Technical Adviser on Biological Warfare; Col. Oram Woolpert, (Professor, Ohio State U.) CWS technical adviser on Biological Warfare, and Lt. Col. Norman Pyle, CWS Technical Adviser on Biological Warfare.

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BIOLOGY-MEDICINE

Biological Warfare

Preparations made by U. S. in top secret research. Japanese also developed germs for offense, but disease weapons were not used in World War II.

By WATSON DAVIS

► ADD GERMS to the atomic bomb, rockets and other new weapons that can be expected to be used in any future wars.

The War Department released a report on America's extensive preparations to combat and undertake biological warfare. These researches undertaken by nearly 4,000 scientists, Army and Navy personnel, in four war laboratories in Maryland, Mississippi, Utah and Indiana, were "top secret" even after V-J day until the announcement.

Biological warfare was not used by the United States. While intelligence reports after the Japanese occupation showed that the Japanese army fostered offensive developments in this kind of warfare from 1936 into 1945, the report states there is no evidence that the enemy ever resorted to this means of warfare.

The biological warfare report, made to the Secretary of War by George W. Merck, special consultant for biological warfare, is notable in not mentioning any specific disease by name.

But it does define biological warfare as "the use of bacteria, fungi, viruses, rickettsiae and toxic agents from living organisms to produce death or disease in men, animals, or plants." These agents are distinguished from synthetic chemicals used as gases or poisons, or what is usually called chemical warfare. Biological warfare thus has a very wide scope.

Used in World War I

The report declares that biological warfare was used in World War I, and that "there is incontrovertible evidence that in 1915 German agents inoculated horses and cattle leaving the United States ports for shipment to the Allies with disease-producing bacteria."

The possible use of biological warfare was brought to the attention of the War Department in the fall of 1941 and Secretary Stimson requested a National Academy of Sciences committee to survey the situation and future possibilities.

A supersecret committee called the War Research Service was organized in the summer of 1942 to take charge of biological warfare investigations. Work-

ing with the Army, Navy, U. S. Public Health Service, the National Academy of Sciences, the National Research Council, OSS, FBI and other agencies, this organization asked the Chemical Warfare Service of the Army to take over a large-scale development and research program in November, 1942. The first laboratories and pilot plants were begun in April, 1943, at Camp Detrick, Frederick, Md. Subsequently, field testing stations were established in Mississippi and Utah and large scale production was investigated at a plant in Indiana.

Only 60 Infections

Only 60 cases of proven infection caused by accidental exposure to virulent biological warfare agents are reported during the researches and all recovered completely or are recovering. There were also 159 accidental exposures which received prompt treatment and did not develop infection, except one case in

which the exposure was not reported, the disease developed and the person recovered after treatment.

The biological warfare program was undertaken, the report states, "under the goad of necessity and aimed primarily toward securing for this nation and its troops in the field adequate protection against the possible use by our enemies of biological warfare agents. Adequate defenses were devised and the possibility of surprise from this quarter was forestalled."

Of Lasting Value

Much information of great and lasting value for human welfare was obtained, the report claims. Unique facilities were established for research and experimentation on pathogenic agents on a scale never before possible.

Important accomplishments of the biological warfare program listed in the report are:

1. Development of methods and facilities for the mass production of microorganisms and their products.
2. Development of methods for the rapid and accurate detection of minute quantities of disease-producing agents.
3. Significant contributions to knowledge of the control of airborne disease-producing agents.
4. Production and isolation, for the



PEACETIME HEALTH AIDS—While investigating possible enemy use of infectious disease as a weapon, Naval Medical Research Unit No. 1 also assimilated information for control of communicable airborne diseases. Here an autopsy is held on one of the animals infected during the course of studies at the University of California. Official U. S. Navy photograph.

first time, of a crystalline bacterial toxin, which has opened the way for the preparation of a more highly purified immunizing toxoid.

5. Development and production of an effective toxoid in sufficient quantities to protect large scale operations should this be necessary.

6. Significant contributions to knowledge concerning the development of immunity in human beings and animals against certain infectious diseases.

7. Important advances in the treatment of certain infectious diseases of human beings and animals, and in the development of effective protective clothing and equipment.

8. Development of laboratory animal propagation and maintenance facilities to supply the tremendous number of approved strains of experimental animals required for investigations.

9. Applications of special photographic techniques to the study of airborne microorganisms and the safety of laboratory procedures.

BIOLOGY-MEDICINE

International Effects

Germ warfare is bound to have widespread effects. Medical discoveries useful in peacetime are likely to justify war researches.

By WATSON DAVIS

► WE KNOW THAT Pandora's box of germ warfare actually exists. Although the lid was not opened in war, it is potentially as frightening as the atomic bomb. The scientists are not yet permitted by the War Department to tell what they found in their supersecret medical and biological war researches.

Until there are scientific reports naming diseases, telling about counter measures and giving hints for peacetime usefulness, we can neither assay fully the dangers nor tell definitely whether biological warfare researches will bring more good than evil.

The Merck report released by the War Department, giving no credit to either the disease organisms studied or the scientists who studied them, is an obviously abbreviated document. In all probability it was strenuously edited and bluepencilled in what Army officers conceived to be the interests of military security. It tells far less about biological warfare than the Smyth report does about atomic warfare.

10. Information on the effects of more than 1,000 different chemical agents on living plants.

11. Studies of the production and control of certain diseases of plants.

Still more is to be learned about biological warfare, the report warns, and the research "must be continued on a sufficient scale to provide an adequate defense."

In organizing the world for peace, the report declares, "the potentialities of biological warfare cannot be safely ignored."

"Unlike the development of the atomic bomb and other secret weapons during the war," the report warns, "the development of agents for biological warfare is possible in many countries, large and small, without vast expenditures of money or the construction of huge production facilities. It is clear that the development of biological warfare could very well proceed in many countries, perhaps under the guise of legitimate medical or bacteriological research."

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Conflicts are bound to rise and be aired in public between the scientists who want their traditional freedom of scientific publication and the military who wish to hold on to "secrets." Biological warfare scientists may find themselves joining the atomic bomb scientists in fighting for their scientific liberties.

The biological warfare research was one of the most extensive coordinated medico-biological investigational programs in history. Probably it cost somewhat less than a twentieth as much as the atomic bomb researches. The cost was certainly in the scores of millions of dollars.

If there had been a relatively full revelation of what has been done, the whole undertaking might have a different public reception.

At the same time the U. S. preparation for and against biological warfare—fighting with bacteria, fungi, viruses, rickettsiae, and toxic agents from living organisms—was announced, there was also made known by another agency the triumph of American chemistry over malaria through the development of a

suppressive drug, SN 7618, better than both atabrin and quinine. This is a most constructive war research, useful in peace.

Probably a half-dozen similarly great medical achievements are hidden by the present biological warfare secrecy. If they are announced promptly they might immunize the public against some of the horror of the idea of protecting ourselves against the use of diseases as weapons.

Undoubtedly far more good than harm will come out of America's biological warfare researches. It would have been

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foolish not to have developed all defensive and offensive angles of this potential weapon. Our enemies were or could have been at work in their medical laboratories.

On the eve of the United Nations Organization's first general assembly, even the facts about biological warfare so far developed may seem to add to the diffi-

culties of building the peaceful world. Like the atomic bomb, however, biological warfare makes a united peaceful world all the more urgent.

The only hope is to bring germs and atoms alike into the open so that they may be controlled in the interest of all peoples.

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BIOLOGY-MEDICINE

Harmful Effects Persist

Biological warfare doesn't stop with surrender or armistice; once it is let loose it cannot be brought under control again like other forms of war's destructiveness.

By FRANK THONE

► BIOLOGICAL warfare, loosing the germs of pestilence against whole peoples, will undoubtedly strike humane-minded persons as the ultimate in atrocities. It isn't, necessarily: people suffer just as agonizingly from flame-hurt and bomb-blast as they would from plague or cholera—or whatever diseases might be sown among them by an enemy.

No, the worst horror about biological warfare is that once loosed it cannot be brought under control again. Other forms of war's destructiveness are more or less self-limiting: they run their course and stop. The most awesome of them all, the atomic bomb, strikes with the suddenness of a thunderbolt. Most of the thousands who died in Hiroshima and Nagasaki did not even have a hundredth of a second in which to realize that they were dying. Other explosives, though more limited in scope, can be almost as instantaneous in effect.

Incendiary fires, though self-propagating, are also self-limiting. A town or a factory may burn for days, but when everything combustible has been consumed the fire goes out. When the victor moves in, he finds the ruins charred, but cold.

Even the worst of the poison gases, like lewisite and the nitrogen mustards, are limited in their effects. They may contaminate an area so severely as to interfere with the advance of the user's own troops, but after a couple of good rains their curse is washed from the countryside.

Not so, however, with the germs of disease that man may launch against his fellow man, or his ox and his ass, or his wheatfield and vineyard. These are self-propagating but not self-limiting, except

in the mysterious fashion that some epidemics have, of "running their course". But even then, there always remain some reservoirs of the disease, in which it remains latent for a time and then breaks forth again.

The same would be true of artificially propagated diseases of crop plants or of forest or orchard trees. Once an infestation is let loose among them it is almost never eradicated. One or two such plagues have been stopped, but only by most drastic methods and in limited areas, like the outbreaks of citrus canker and the Mediterranean fruit fly in Florida some years ago. For the most part, however, the story is one of heroic effort and final failure: black stem rust of grains, late blight of potatoes, codling moth in fruits, are only three out of a thousand possible examples. And their mischief was wrought blindly and spontaneously; they had no aid from a malicious enemy in getting started.

We must face the fact that if one nation launches such uncontrollable agencies of harm against its neighbor, the war will never stop. Plagues and pests recognize no surrender, know no armistice. A germ-conquered people will make occupation unsafe for the conqueror's troops unless they are thoroughly immunized; and although the weakened survivors may offer no resistance to the victor's will they will be too inert to give obedience to his decrees. Their wasted fields, with blights still sweeping on unchecked, will have little capacity to pay reparations.

Such pestilence-ridden lands could easily forbid entry to victorious armies, even though the exhausted losers could not fire a shot against them, simply through fear of the black tributes of defeat that homegoing troops might carry



PROTECTION NEEDED—Resembling a "Man from Mars," a man wearing a rubberized protective suit prepares to go about his duties at the Naval Medical Research Unit.

back with them. If intercontinental war is ever waged with biological weapons, it may become necessary to maintain intercontinental quarantines for years afterwards, with communications (if any) maintained only by cable and radio, and even the magnanimous victor's charity gifts of food and medicine dropped hastily from speeding planes or impersonally hurled across the oceans in rocketcraft.

Biological warfare can be terribly devastating. But it is a two-edged weapon, not to be lightly unsheathed.

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SEISMOLOGY

Last Earthquake Of 1945 "Got Lost"

► THE LAST big earthquake of 1945 "got lost" and has only now been turned up by seismologists of the U. S. Coast and Geodetic Survey, after a study of data transmitted by wire and radio through Science Service. It was a very heavy shock, but probably produced no harm, for it shook the ocean bottom off the northern coast of New Guinea.

Epicenter location was in approximately 5 degrees south latitude, 147 de-

grees east longitude. Time of origin was 12:48.4 p.m., EST, on Friday, Dec. 28.

Observatories in England and Australia announced on incomplete data that the earthquake took place in the Antarctic regions. This was an entirely natural mistake, for when earthquake locations are given on the basis of observations by only one station they may be fully 180 degrees off the compass bearing estimated by the observer. Only when reports from three or more stations are available is it possible to strike

intersecting arcs and pin the epicenter down to a definite locality.

Seven stations reported to Science Service. They were the observatories of the Jesuit Seismological Association at St. Louis University, Weston College in Massachusetts and Spring Hill College in Alabama; the observatories of the U. S. Coast and Geodetic Survey at Honolulu, Tucson, Ariz., and College, Alaska; and the observatory of the California Institute of Technology at Pasadena.

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PLANT PATHOLOGY

Could Attack Food Crops

Fungus-spore blasting of Japanese rice and other food crops could have followed atomic bomb if Japs had put up a fanatical resistance.

By FRANK THONE

► IF THE Japanese had put up the fanatical, last-man resistance on their home islands that many expected of them and used the biological warfare they were preparing, atom-bomb blasting of their cities might have been followed by fungus-spore blasting of their rice and other food crops, to starve out the scattered resistance forces hiding in the hills.

By the same token, that kind of starvation strategy might be used against any people in a future war, if cities are broken up and populations dispersed to make the concentrated attack of atomic missiles difficult and unprofitable.

Although no specific kind of disease-producing organism is mentioned by name in the just-released report by George W. Merck, special consultant to the War Department, his definition of biological warfare explicitly includes the use of bacteria, fungi and other disease germs against plants as well as against men and animals. The scope of biological warfare might properly be extended to include larger organisms, such as insects and parasitic worms, whether they cause disease directly, serve as carriers of diseases like malaria and typhus, or produce crop failures by ravaging the fields.

One of the advantages that lies with the attacker, in this kind of warfare, is the enemy's inability to determine what is harming him until the mischief has actually commenced. For any given crop, several distinct kinds of plant-disease germs are at the choice of the attacker, no two of which can be met

with exactly the same means of defense.

As a specific example, rice is attacked by half-a-dozen fungus diseases bearing such depressing names as blast, black smut and mildew. Sweet potatoes, another highly important food crop in Japan, has to contend with black rot, dry rot, ring rot, soft rot and white rust, which are all fungus-caused; also with burrowing nematodes, which are small, soil-infesting worms; with several virus-caused diseases, and with one or two bacterial rots. Soybeans, a third great standby in the Orient, are attacked by at least five different kinds of fungi, four or five kinds of bacteria causing blights and leaf spots, a virus causing mosaic disease, and finally by a nematode that causes root-knot.

This array of farmers' woes affects only three crops, and does not include the insect enemies of even those. Probably not all of these fungi, bacteria and viruses could be pressed into service for the purposes of biological warfare, but certainly enough of them could be to make the lot of the Japanese farmer even more unhappy than it normally is.

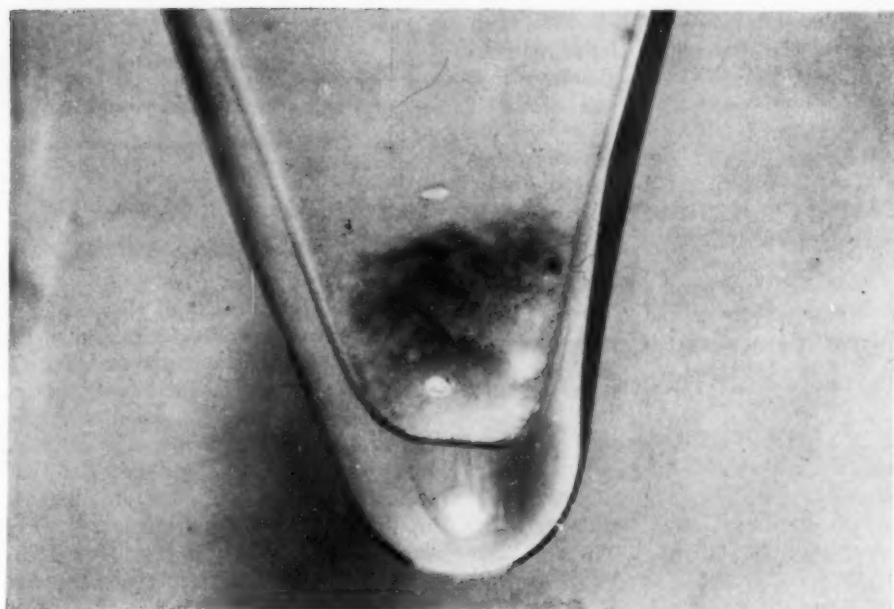
In Europe, different crops have major importance, and different diseases would be used against them. The attack would probably center on the grains, potatoes and sugar beets. All the grains, including American corn which is extensively grown in the Danube and Po valleys, are susceptible to smuts, rusts and root rots, all of which are fungus-caused. There are plenty of other grain diseases, but these alone would cause plenty of trouble. Potatoes are liable to the blight that caused



THIS IS NEPTUNIUM — Dark brown neptunium dioxide is shown at the bottom of a capillary tube. About 10 micrograms is shown and it is the first compound of this element to be isolated. This neptunium is the long-lived isotope 237 and it was isolated June 21, 1944, from uranium bombarded with neutrons from a cyclotron. Magnification is about 15 diameters. The scale shows millimeters and part of a dime appears in the photograph. Photograph from Dr. Glenn T. Seaborg, discoverer of elements 94, 95 and 96, who did chemical work on the atomic bomb elements. One isotope of neptunium is a stepping stone to the formation of plutonium, one of the atomic bomb elements.

the great Irish famine of the 1840's, as well as to several serious virus diseases; it might be possible also to sow striped American potato beetles across the fields from low-flying airplanes. Beets are susceptible to several virus diseases, to a number of rots that attack their big, juicy roots, and to such fungus-caused ills as root tumor, dry rot and leaf spot. Obviously, biological warfare might play hob with Europe's ability to feed its own population.

Still another kind of biological warfare might consist in sowing seeds of foreign weeds. America has had plenty of bitter experience with alien plants even though



ATOMIC BOMB ELEMENT—A compound of plutonium, isotope 239, one of the first pure compounds ever isolated, is shown as a colored cloudy mass resting on the rather thick bottom of a test tube. What is seen is about 20 micrograms of greenish-brown plutonium hydroxide and magnification is about 50 diameters. This compound was made about three years ago (1942) and the plutonium was made by bombarding uranium with neutrons from a cyclotron, predating by far anything made by the chain reaction used in making plutonium for actual use in the atomic bomb. The two or three white spots and black spot are merely imperfections in the photograph. Photograph from Dr. Glenn T. Seaborg, one of the discoverers of plutonium. Plutonium is one of the two fissionable elements used in the atomic bomb, the other being uranium 235.

they were not purposely introduced. We might in turn export such baneful growths as bindweed or wild morning-glory, Canada thistle and cocklebur, all of which are native to this continent.

Success in biological warfare would call for close cooperation of scientists. Biologists of all kinds would have to work as hard, and perhaps on almost as sweeping a scale, as the physicists when they made atomic energy available for military purposes. Meteorologists would have to be consulted even more closely than they are before the launching of an air attack or the use of the gases and smokes of chemical warfare; for the spores and other propagating bodies of the fungi, bacteria and crop-ruining parasites are very choosy about the conditions of temperature, moisture and sunlight under which they will operate. Geologists and soil chemists would very likely have a word to say about the chances of the germs falling on favorable ground.

Taken all round, then, biological warfare directed against the enemy's food supply would call for the intensive ap-

plication of much knowledge and skill by many scientifically trained men. But if it proved successful, its effects would be as damaging in the fields as a rain of fire-bombs over a city.

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AERONAUTICS

New Long-Range Patrol And Search Bomber

► A NEW Navy long-range patrol and search bomber, recently announced, is the first Navy land plane conceived and built especially for this particular purpose. It has a range of more than 3,500 miles with a full patrol load, a speed of over 300 miles an hour, is equipped for fighting if necessary, and carries a ton of the very latest radio and radar apparatus.

The new plane will be designated as the P2V, Neptune, and was built by Lockheed Aircraft Corporation. The first Neptune has already been extensively tested, and additional planes will be delivered soon.

Neptunes are designed to be used to

patrol regions around Navy continental and island bases, and to search waters ahead of a moving fleet. For the purpose, a self-sustaining plane is necessary, one that can fly long distances, cover wide expanses with its search radar, protect itself and deliver an accurate attack. From nose to tail, it is fitted for long-out, lone-wolf tasks.

This patrol plane is equipped with two Wright 3350 radial engines and with four-bladed propellers. It can fly on one engine in an emergency. It is armed with six 20-millimeter cannon, 16 five-inch high-velocity aircraft rockets, and four .50-caliber machine guns. It can carry 8,000 pounds of explosives, including two aerial torpedoes.

The gross weight of the Neptune is 58,000 pounds. A high degree of maneuverability is claimed for it because of its particular design. It is a mid-wing monoplane with a wing-spread of 100 feet. Its fuselage is 75 feet long, and the plane has tricycle landing gear. Its normal crew is seven.

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ICHTHYOLOGY

Only Three "Left-Eyed" Flounders on Record

► THERE ARE only three authentically known cases of winter flounders with eyes on the left side of their heads instead of on the right, states Dr. E. W. Gudger of the American Museum of Natural History. Of these, only one is now represented by an actually existing specimen, which is in the American Museum collections. (*Science*, Dec. 28.)

Flounders and their ichthyological relatives are odd fish. In early youth they settle to the bottom and lie down on one side all the rest of their lives, except for very brief spurts of swimming. Their "underneath" eyes migrate around so that both right and left eyes come to be on the same side of the head.

Some species apparently flop on either side more or less indifferently, so that "right-eyed" and "left-eyed" specimens appear in more or less equal numbers. However, in the winter flounder, known scientifically as *Pseudopleuronectes americanus*, the tendency to lie on the left side and have eyes on the right is practically universal. Only the three exceptions noted by Dr. Gudger have ever been seen.

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There are over 50 electric devices that can be used in average homes.

ASTRONOMY

War-Ruined Observatory Will Be Rebuilt

► A NEW astronomical observatory will rise upon the ruins of war-destroyed Pulkovo Observatory, near Leningrad, it was announced by President A. Mikhailov of the USSR Academy of Sciences Astronomical Council in a message of new year's greetings from Russian astronomers to their American colleagues.

Hope that the forthcoming year would be a year of still closer collaboration and friendship among the scientists of the two nations was expressed by Prof. Mikhailov.

The southern branch of Pulkovo Observatory at Siemeis in Crimea was also destroyed, Prof. Mikhailov recalled, by "the most cunning and aggressive enemy who brought such great destruction to the peace-loving people of the Soviet Union and their cultural and scientific institutions."

"The astronomical year 1945 that is ending brought the greatest victory to the Allied armies in which American, English and Russian soldiers fought side by side," the Soviet astronomical leader said.

During the celebration of the 220th anniversary of the USSR Academy of Sciences last summer Dr. Harlow Shapley, director of Harvard College Observatory, and Astronomer Royal Sir Harold Spencer Jones visited the Pulkovo Observatory ruins and expressed the hope that the famous observatory would be rebuilt.

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CHEMISTRY

Plastic-Coated Yarn For Superior Insulation

► A PLASTIC-COATED yarn provided U. S. Navy vessels with electrical insulation said to be superior to the insulation used by other navies, it is now revealed. The relatively new material is also waterproof, rustproof and immune to extremes of temperature, and is resistant to mild acids and alkalis. Fiberglass, cotton, or rayon thread is used under the plastic coating.

Both Army and Navy used the plastic-coated yarn for other purposes than insulation, particularly for window screens, where its strength and immunity to rust make it especially serviceable. It will now find many applications in civilian uses, ranging from perspiration-resistant girdles and foundation garments

to industrial conveyor belts and fish lines. A heavy webbing of the material is suitable for wide use in furniture that may be left outdoors in all kinds of weather.

This plastic-coated yarn is known as Plexon, and is made in New York by Freyberg Bros-Strauss. It was developed by two French chemists.

Science News Letter, January 12, 1946

CHEMISTRY

New Chemical Compound Dyes Nylon Thread Cheaply

► NYLON THREAD may be dyed cheaply by use of a new chemical compound in the alkyl phosphate family with which successful tests have now been completed. It will be known as Phosphate No. 12, and is the result of work of scientists in the laboratories of the Victor Chemical Works in Chicago Heights, Ill.

The chemical is a dye-carrying penetrant which simplifies the dyeing process, company officials state. It can be used in equipment already standard in modern dyeing plants. In addition to providing even penetration of the nylon thread or yarn under treatment, the new phosphate is foam-free, an objective toward which chemists have been working for years. It is stable in the presence of both acids and alkalis, and is non-ionic or neutral in electric charge, it is claimed.

Science News Letter, January 12, 1946

CHEMISTRY

Silicone Oils Flow At Minus 121 Degrees

► SILICONE oils suitable for use as hydraulic fluids in aircraft systems, that will continue to flow at 121 degrees below zero Fahrenheit and do not oxidize or sludge at 302 degrees above zero, have been developed in the General Electric laboratories in New York. They can be used also in fine instruments, watches and clocks, and as an insulating fluid in certain electrical apparatus.

These oils are prepared with methyl silicone polymers, according to Dr. Eugene G. Rochow of the General Electric Company. He explained that these polymers, in the form of elastomers, produce a silicone rubber that does not decompose at 400 degrees Fahrenheit or harden at 67 degrees below zero, and maintains its elasticity under load over long periods of time at the high temperature of 302 degrees.

Science News Letter, January 12, 1946

IN SCIENCE

CARTOGRAPHY

Terrain Models Made With Two New Devices

► CONSTRUCTION of three-dimensional terrain models, long known to map makers, but too costly and inaccurate for popular production, has been revolutionized into a science, with the invention of two devices, the Atcorob and the Orthojector. Designed and constructed during the war to prepare models for operational planning, these inventions permit production of accurate and detailed models of any area on the globe.

The Atcorob is an ingenious device that accomplishes in two operations what formerly required eight different procedures. Contour lines from a topographic map can be quickly and accurately indicated on a block of solid plaster and reproduced by carving down to the surface of the image. Contours appear on the model exactly as on the map except that they are three-dimensional.

"No other device or method of construction has approached the Atcorob in ability to reproduce terrain features," said Maj. Wallace W. Atwood, Jr., Chief of the Staff Service Model Section of the War Department.

The Atcorob was conceived by Maj. Atwood, Prof. H. L. Cooke of Princeton University and Capt. A. H. Robinson, Chief of the Map Division of the Office of Strategic Services. It takes its name from the first two initials of the inventor's names. The equipment was designed by Prof. Cooke and Dr. R. Prickett, and constructed by them at the Palmer Laboratories in Princeton, N. J.

The Orthojector, devised by the same group, is helpmate to the Atcorob and makes possible a projection of map or photo transparencies onto the surface of any type relief model. Information may be transferred onto a flat or irregular surface without the distortion obtained in the previous single-lens projectors.

The information projected onto the surface is in its correct position. Roads go through correct passes, rivers through their valleys. The Orthojector is the only instrument thus far produced which assures accurate projection such as this on a relief surface.

Science News Letter, January 12, 1946

SCIENCE FIELDS

MEDICINE

Heavy-Weight Carbon To Aid Medical Research

► FOR USE in research on cancer, diabetes, arterial, heart and other diseases, carbon of atomic weight 13 will be produced in substantial quantities, the Sun Oil Company and the Houdry Process Corporation announced.

This heavy carbon isotope has been used in biochemical research for the past two years and now two plants are to be constructed to produce it in larger quantity, increasing from 500 to 1,000 times the world supplies of this chemical element.

Carbon 13 is concentrated by thermal diffusion, separating it from ordinary carbon 12. The new plants will bring the cost down to about \$40 a gram, whereas the experiments were started with less than a half-gram which cost several thousand dollars to concentrate.

Carbon 13 serves as a tracer in chemical reactions in living and non-living material since by its different weight it can be spotted and told from ordinary carbon.

The work was initiated and carried on by Dr. Aristid V. Grosse of the Houdry organization, assisted by Dr. E. A. Smith, Houdry research director, Dr. Stanley P. Reimann, director of the Lankenau Hospital Research Institute of Philadelphia and others in these two organizations.

Science News Letter, January 12, 1946

PSYCHOLOGY

Talking Books Make Reading Quicker for Blind

► BLIND children in the third and fourth grades "read" about three times as fast with talking books, which are simply a series of phonograph records, as in braille, where the alphabet is represented by a pattern of dots embossed on paper.

But this does not mean that talking books should replace braille in schools, states Dr. Berthold Lowenfeld, Director of Educational Research of the American Foundation for the Blind. In the upper grades, students who have become proficient in braille get more out of reading difficult material in the dot-

pattern than from listening to talking books.

While less bright blind children in the third and fourth grades understand the lesson better when talking books are used, in the sixth and seventh grades blind pupils of low intelligence get more out of textbook material when reading braille. Braille can be read at the pupil's own rate of comprehension, while the records must be played at a definite speed irrespective of the child's ability to understand the subject matter.

Both braille and talking books should be improved, however, Dr. Lowenfeld believes. Better methods of teaching would enable the pupil to read braille more rapidly. Talking books can be made more interesting and hold the listener's interest better by using sound effects and, perhaps, dramatizations.

Tests to compare the advantages of talking books and braille reading were given to 481 children in 12 schools for the blind.

Science News Letter, January 12, 1946

ANTHROPOLOGY

Fossils of Early Man Survive Japanese War

► INFORMATION received by Dr. Franz Weidenreich of the American Museum of Natural History indicates that fossil skulls and other remains of very early human types, in areas overrun by the Japanese during the war, have survived the vicissitudes of conquest and reconquest.

From his long-time co-worker, Dr. G. H. R. von Koenigswald, who just before the war had made several significant finds of ancient human fossils in Java, he has had a letter telling of hardships endured during the Japanese occupation, but stating that only one of the skulls from the Mgandong site had been taken to Japan and presumably lost. All the others were again in his possession, and at the time of writing (Oct. 23) he was hoping soon to return to his digging.

Frank Whitmore, a colleague of Dr. Weidenreich's, found in the Imperial University of Tokyo a collection of bones and artifacts from Choukoutien, China, the place where Peking Man was first discovered, together with the original research records of Dr. Davidson Black, who first made systematic excavations at that site, and other important papers. Arrangements are under way for the return of this important scientific material to the institution to which they belong, Peiping Union Medical College.

Science News Letter, January 12, 1946

PSYCHOLOGY

Rats Housed in Groups More Likely to "Freeze"

► WHEN laboratory rats aggravate experimenters by "freezing" or playing dead instead of running through a maze, it may be the result of living with other rats.

The habit of some rats to simply sit at one point in the maze instead of trying to find their way out has in the past been ascribed to emotional disturbances or "pure cussedness." But Dr. Bernard F. Riess of Hunter College decided to put the matter to a test.

Two groups of rats were used in his experiments, one group lived in "tenements," six rats to a cage, while the others were given private quarters. Fighting was common among the "room-mates."

The "freezing" behavior was indulged in by 18 of the 124 rats living in groups, Dr. Riess states in the journal, *Science*, while only two of those from the private quarters had acquired the annoying habit. Fifteen of the rats that "froze" were consistently victims of aggression in the household fighting, only three were dominant or habitual winners.

Science News Letter, January 12, 1946

ENGINEERING

Electrodes in Sparkplugs Now Grow with Use

► SPARKPLUGS with electrodes that grow with use instead of wearing away, and a new airplane ignition system for high-altitude flying, are recent contributions to aviation developed by the electrical engineering department of Yale University. The life of the sparkplugs is considerably lengthened by the development, and in the new system they are fired by radio frequency currents.

The special electrodes with which the sparkplugs are equipped grow in physical length as they are used, by approximately the same amount that the ordinary electrodes wear away. This keeps the spark gaps more nearly constant, and doubles the length of life of the plugs, it is claimed.

The principal feature of the new ignition system is the use of high-frequency currents to fire the new sparkplugs. The two developments constitute a valuable combination in planes, particularly at extremely high altitudes. They were developed at Yale by Gregor Lang of the American Bosch Company.

Science News Letter, January 12, 1946

PSYCHOLOGY

Selecting Secret Agents

Men's actions were tested for OSS service under conditions of strain and also relaxation. Method may be adapted for picking executives, diplomats.

By MARJORIE VAN DE WATER

► HOW the super-secret agents of OSS were picked for duty overseas has now been revealed. An intensive three-day test showed a staff of examiners how the candidates for delicate missions into enemy territory could work and deal with other people under grueling conditions of mental or physical strain, or under the relaxing influence of liquor and quiet conversation. The new method may in future be adapted for picking high-powered executives, diplomats, salesmen, G-men, or leaders of men for important peacetime posts.

An obstacle course, intelligence tests, cross-examination Nazi-style under blinding lights, opportunity to drink hard liquor, and casual observation while the candidates were eating or relaxing for recreation were all parts of the thorough "assessment of the whole person" that made up the OSS examination as reported by Lt.-Col. H. A. Murray, of the Office of Strategic Services, to the Military Division of the American Psychological Association. Col. Murray had the assistance of Dr. Donald W. MacKinnon.

Successful Selection

About one out of five was "not recommended" for overseas service. Another one out of five did not succeed in going for other reasons. But of those who were sent abroad on their perilous missions, only about six out of a hundred failed to make good, it was shown by a survey of the first 300 sent. Their tasks varied from parachuting into enemy territory for sabotage or subversive activity to writing propaganda leaflets in the comparative safety of London under a rain of Nazi bombs.

During the three-day test period, the candidates, in groups of 18, lived on a country estate outside Washington where they associated day and night with the senior staff of officials testing them. This staff consisted of psychologists, psychiatrists and sociologists.

The secrecy and mystery popularly attributed to OSS was extended to the examining staff who were not permitted

to know the identity of the men they were testing. The candidates arrived with fictitious names and dressed in disguising Army fatigue uniforms.

No one could tell whether a candidate was a general, a lieutenant, a private or a civilian—and all were included among those tested. No candidate knew the rank of the man next him, and that itself served as a kind of test.

The first night the candidates were given standard intelligence tests and other tests where they were required to fill in missing words designed to bring out tendencies to think in a peculiar manner. Later they were each given a one or two-hour interview by one of the staff who had previously studied the test records. They were given a test where they had to find the way out of a difficult situation; some of these were staged outdoors. They had to run a difficult obstacle course to demonstrate their physical agility and strength. A contrast to this was the task of sitting down and writing propaganda leaflets intended to break up the morale of the enemy.

Another novel test they had to face was the psycho-drama now being used widely for training purposes and as therapy for the mentally and emotionally ill. The candidates would be put on a stage to act out a drama, but instead of having fixed parts to learn, they were placed in a prearranged situation and had to make up their own lines as they spoke them. The idea was to meet the situation in the best way.

The candidates were pressed into service as examiners. Each man was asked to write a character sketch of each of five other men whom they had learned to know well. They had to answer certain questions such as whether they would pick him for a leader and whether he would do well in a perilous job.

There was a "brook test," in which they were taken to a brook running through the estate and told they had to move a heavy but very delicate instrument across the brook alone with only the aid of some boards, rope and tackle that were there on the ground. Another test was applied to them when they were required to form a group for discussion,

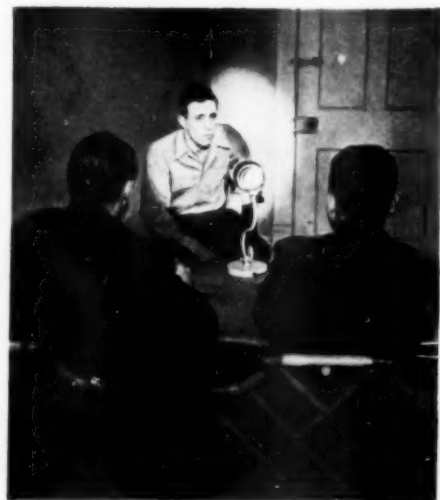
electing a chairman and conducting the debate. The purpose of this was to see who would assume leadership, who would try unsuccessfully to get it, who would produce the best ideas for discussion and how well all could work together without outside orders or direction.

In another test each man had to work on a construction job. He was told that it was not possible to complete the task in the time allowed but he could have the assistance of two men. The men were actually stooges who began by helping, but later one showed that he was lazy and stubborn and the other was very active but full of absurd ideas and later insulting. No one proved able to complete the construction. Some went to pieces emotionally. What they did when angry was revealing.

Cross-Examination

In another test each man was told to assume that he had been caught going through secret documents and had to give an explanation to officials. This was followed by the grueling cross-examination.

Final test came on the last evening when they were told that all the hard tests were over and that they might relax. Strong liquor was available to all who wanted it and an informal discussion was started on what to do with Ger-



NAZI STYLE—Agents for overseas duty had to be able to stand up under grueling cross-examination. OSS photographs.



EXACTING TEST—Ingenuity as well as agility is necessary to get this "camouflaged king-size bazooka" across the chasm between the two walls. It happens that, with care, the bazooka can be made to just reach across so that the men can use it for a bridge and this is just about the only method for getting over—a good test for candidates for the OSS.

many after the war. Liquor loosened tongues and many men expressed ideas that they might have hesitated to mention otherwise. The talks were always interesting and often continued until two or three in the morning.

Details of the testing method will be described in a book, *Assessment of Men*, now in press (Houghton-Mifflin).

It is expected that the methods worked out for selection of OSS men will have important applications in industry and civilian selection now that the war is over.

Although it is not likely that this particular test set-up would be useful in peace except perhaps for selection of FBI agents or police officers, the idea of assessing an applicant's total resources instead of some one qualification such as intelligence or speed in typing would be applicable to a multitude of selection needs.

For many jobs, personality factors are quite as important as is mental keenness or trade skills. But bravery, calmness under heckling, ability to control temper, facility in persuading a group to take some action, are much more difficult to assess than is the ability to figure

interest on an investment or sort cards alphabetically.

The testing method worked out under Col. Murray illustrates the importance of studying the job and determining the qualities needed. It shows the value of using a staff of examiners from the different fields of psychology, psychiatry and sociology with perhaps other fields represented for other types of job. It shows that you can learn something about men by living in the same house with them for a few days and associating with them at meals, over a game of tennis or chess, or relaxed in an easy chair for a friendly "bull session" in the evening.

After such social contact, the staff of examiners may place a higher evaluation on the individual worth of a particular applicant than his written examinations would lead to.

In such informal situations, the applicant for insurance salesman or college president, foreman or bank examiner, receptionist or handler of complaints, lecturer or floorwalker could "show their stuff" as they never could in the artificial situation of an examining room or brief, formal interview.

Science News Letter, January 12, 1946

CHEMISTRY

Mercury Chlorine Cell To Be Studied in Germany

➤ A COMMISSION representing American domestic chlorine producers will soon visit Europe to secure full technical information relative to the German mercury chlorine cell. Another group, in America, will determine the place and scope of tests for two types of the cell which will be brought to the United States by the Army Chemical Warfare Service. Both committees are sponsored by this Army service.

The program to exploit the German mercury chlorine cell and make it available to American industry was launched by the Chemical Warfare Service in cooperation with the American chemical industry. This cell has been developed much further in Germany than in the United States, it is reported. It was given impetus by war expansion of the German caustic and chlorine industry, abetted by the cheapness of mercury there due to relations with Spain, the mercury-producing country, during the war.

One advantage of the mercury cell is that it eliminates expensive evaporating equipment. A new vertical rotating type used by the Germans toward the end of the war requires much less floor space than conventional horizontal types.

A trend toward liquefaction of chlorine by means of higher compression, followed by water cooling without artificial refrigeration, was also noted in Germany by representatives of the Chemical Warfare Service in a survey of German chemical processes following VE-Day. A new type of rectifier, which was alleged to operate at high efficiency in the lower voltage range, was reported in at least two of the newer installations.

Improved methods of chlorine production will benefit the United States government, the chlorine industry and the American public. Large quantities of chlorine are now used in various industrial and other processes, particularly in bleaching and in water purification.

Science News Letter, January 12, 1946

Sugar is one of the four staple foods of the Iranian people, the others being bread, rice and tea; Iran produces sugar for about one-third of its requirements.

Corn in tropical countries is in danger of fermentation, due to the warm climate and the high humidity, unless it is dried immediately after harvesting.

Do You Know?

Snow reflects about 75% of the sunlight falling upon it.

X-rays are used in treating successfully many skin disorders.

New radio noise filters eliminate static or buzzing in electrical equipment and make radio reception better.

The *Gila monster*, only poisonous lizard found in the United States, is especially fond of eggs.

Bottles with a plastic coating are being used to hold certain acids and other liquid chemicals; even if the glass bottle becomes cracked the flexible plastic will hold in the contents.

Mining in the Philippines in prewar days gave direct employment to about 250,000 persons; rehabilitation of the industry is slow because of Japanese theft or destruction of buildings, machinery, tools and supplies.

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Winter Fruits

► FRUITS, we are accustomed to think, are things belonging to autumn and late summer, not to winter. We are also used to thinking of fruits as something suitable for eating; peaches and plums, pears and quinces, apples and grapes. It hardly occurs to us to consider as real fruits such things as the seed-balls of sycamore trees, or the peppercorn-like "seeds" of lindens, suspended beneath their oddly-built but efficient gliders.

Yet these dry, unappetizing objects are true fruits, in the botanical sense of the term. The plant scientist, who tries to see things from the plant's point of view, defines a fruit as a seed or seeds, plus associated structures. Thus, acorns are fruit, and so are the winged "keys" of maple and ash, and even the scaly cones of pines and firs and spruces.

Fruits do two things for the seeds they enclose: they give them protection from the weather, and they provide means for dissemination into new territory. The fleshy pulp of edible fruits—the "real fruits" of everyday definition—gets mammals and birds to swallow them, and the seeds, in their digestion-resistant coats, thus get free rides, sometimes to considerable distances. But the glider-wings attached to maple and ash and linden seeds are good carriers, too, especially in a winter storm; and so is the little pinch of downy fluff attached to the small seed of the sycamore, released to serve as a parachute when the crust of the tight little ball is broken.

Some of the winter fruits we see stick to the tree as a matter of necessity. Many species of oaks take two seasons to mature their acorns; those that were fertilized last spring will not be ripe until next fall. The same is true of some kinds of pines and other conifers. And there

are some species of pine that keep their cone-scales tightly closed over the winged seeds beneath them until a fire sweeps through the woods. Then the released seeds find a desolated world to be repopulated.

Of course, not all winter fruits are dry and deadlooking and unappetizing. Plenty of them have a certain amount of pulp around their seeds: persistent-fruited crabapples and red-haws, buckbrush or coralberry, snowberry, several kinds of honeysuckle, false bittersweet, and the junipers that most people call cedars. Such fruits may not appeal strongly to human appetites, but birds find them very acceptable in winter, and in return for the slight amount of nourishment afforded by their pulp will carry the seeds at least as far as the next roosting-place.

Science News Letter, January 12, 1946

The *solenodon* of Haiti is a rat-like animal with an elongated nose like an anteater.

Deposits containing 1,000,000 tons of aluminous *laterite*, a mineral rich in aluminum and iron, have recently been discovered in northwest Oregon.



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PHYSICS

Radio Carbon as Tracer

Understanding of life processes may be aided by mass production of element as by-product of atomic bomb research.

► **LONG-LIVED** radioactive carbon, the production of which in relatively large quantity may well be one of the most valuable peacetime by-products of atomic bomb research, has been used for the first time in laboratory experiments, a group of University of California scientists have announced.

The experiments, which bring man a step closer to an understanding of photosynthesis and provide new techniques for a study of the basic life processes, were conducted with the only known supply of long-lived radioactive carbon produced before the war, a fraction of a gram prepared over an 18-month period by cyclotron bombardment.

Scarcity of the long-lived radio carbon has prevented its widespread use in nearly every scientific field. Use of the element as a "tracer" of living processes by means of the radioactivity is expected to yield a vast fund of knowledge of value in the advancement of medicine, agriculture and other sciences.

Carbon is the most common constituent of all living things, and its very omnipresence provides a yardstick of the potential value of radio carbon in bringing about further understanding of that element's functions.

With the development of the uranium pile technique, as described in the Smyth report, it may be possible to produce larger quantities of carbon 14, the long-lived radioactive sister in the carbon family. The pile technique makes available a larger and steadier stream of neutrons, the particles used to produce carbon 14, than is furnished by the cyclotron.

The minute quantity of carbon 14 used in the Berkeley experiments was produced from 1,000 pounds of ammonium nitrate which were placed in tanks around the 60-inch cyclotron. Stray neutrons from the machine transformed some of the nitrogen atoms of the ammonium nitrate into carbon 14.

In the experiments just completed, the Berkeley scientists synthesized two simple organic compounds, acetic and butyric acid, by feeding heterotrophic bacteria radioactive carbon dioxide and ordinary sugar.

They succeeded in labeling all of the groups of atoms of the two compounds. Previously it had been possible to label one group of atoms in such organic compounds, using short-lived radioactive carbon, which is not suitable for many experimental purposes.

The research indicates that many organic compounds may be labeled in a variety of ways for tracer studies, and make possible the study of the building up and breaking down of food substances in human and other living systems. For example, it will be possible to study the conversion of sugars into fats in the animal body.

Transformation of carbon dioxide is ordinarily accomplished only by photosynthesis, in which green plants use water, chlorophyll and sunlight to produce all carbohydrates, proteins, fats and other plant products.

The ability to build up organic carbon molecules from carbon dioxide by bio-

logical means adds further knowledge on the still-mysterious photosynthetic process.

Several years ago a group of Berkeley scientists carried on experiments with carbon 11, another radioactive sister in the carbon family. However, carbon 11 has a half-life of only 21 minutes, giving researchers a maximum of four to five hours in which to experiment. Carbon 14 has a half-life of 25,000 years, and is therefore suitable for long, complicated chemical procedures.

The scientists who conducted the experiments are Dr. H. A. Barker, associate professor of soil microbiology; Dr. Martin D. Kamen, formerly of the Berkeley Radiation Laboratory and now at Washington University, St. Louis, Mo.; and Victoria Haas, graduate student.

Carbon 14 was discovered at the University of California in cyclotron bombardments by Dr. Kamen and Dr. Samuel Ruben, who died from an accident while conducting war research. (See also carbon 13 story, p. 25.)

Science News Letter, January 12, 1946

The almond tree is a native of subtropical China, Persia, Syria, and Asia Minor.



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MEDICINE

Better Antimalarial Drug

Synthetic chemical, SN 7618, is better than atabrine, much better than quinine. Stops an attack of the disease in 24 hours.

By JANE STAFFORD

► THE WAR SECRET told of the development of two new and powerful drugs against malaria reveals at the same time a triumph of American chemists.

Better than atabrine, much better than quinine is the synthetic chemical SN 7618 they created and sent to the Board for the Coordination of Malarial Studies for testing in April, 1944. This 7618th of the 14,000 substances tested for antimalarial activity turned out a winner.

As a suppressive, for holding the sickness of malaria at bay even though the parasites have invaded the body, SN 7618 needs to be taken only once a week, compared to the daily dose needed when atabrine is used for the same purpose. As a remedy, SN 7618 stops an attack of malaria in 24 hours, while atabrine takes four to six days to bring about recovery.

No yellowing of the skin goes with

taking the white pills of SN 7618. It does not cause stomach and intestinal upsets. Its manufacturing cost is about the same as that of atabrine.

Chemically, this new antimalarial is a member of the 4-aminoquinoline series. German chemists at the I. G. Farbenindustrie plant at Elberfeld had previously, and unknown to American chemists, made 4-aminoquinolines as possible antimalarials and they even had made and patented SN 7618 itself, 7-chloro-4-(4-diethylamino-1-methylbutylamino) quinoline. But they discarded it as no good.

The triumph of American chemists consisted in recognizing its value and, even more, in developing a new method for synthesizing one of the intermediate chemicals needed to create SN 7618. Without this new method, SN 7618 could never have been made on a commercial scale, as it now can be.

Whether SN 7618 will ever be put on

the market seems a little doubtful because other, even better antimalarial chemicals are in the works. One of these, an 8-aminoquinoline, shows promise of being a real cure for vivax malaria. Of three kinds of malaria, this one is most common in the United States and caused most trouble among our forces in the South Pacific.

Atabrine and SN 7618 cure falciparum malaria, a less common but more often fatal kind, actually removing the infection. They do not cure vivax malaria but merely stop each attack of chills and fever. The parasites are still in the body and can cause further attacks, or relapses.

Plasmochin, an 8-aminoquinoline developed in 1930, cures vivax malaria, but the dose for a cure is too close in size to the dose that causes poisoning symptoms. A safer chemical of this type, with a greater "spread" between curative and poisonous doses, has just been developed and tested in patients. For 100 days the patients have gone without relapse of their malaria. If they do not have any relapses during the next 250 days, the scientists will feel sure this latest chemical is the long-sought cure for vivax malaria.

Development of these two new antimalarials, announced in the scientific journal, *Science* (Jan. 4) was only a part of the work carried on in universities, government agencies and commercial firms by scientists whose efforts were coordinated by the Board for the Coordination of Malarial Studies.

Altogether, 14,000 substances were tested. These ranged from fertilizers, plasticizers, Nylon intermediates and rubber accelerators to Chinese herbs, mud from the River Nile, and eggshells suspended in choice whisky. Some, the nylon intermediates, plasticizers and such, were picked from the shelves of organic chemical supply rooms. The odder items were sent by persons who had heard that eggshells in whisky, special muds, roots, herbs and so on, were good medicine for malaria.

The Board's scientists tested them all. It was easier, one member explained, to make the tests and send a scientific report than to write a letter explaining convincingly why the lower leaves of the cotton plant, for example, were not likely to prove a cure for malaria.

Chickens, canaries and ducks by the hundreds of thousands were used to screen the promising from the unpromising chemicals studied. Those which proved effective against the malaria parasites in these birds were then tested for possible poisoning action in mice and

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other animals, including thousands of monkeys obtained through the aid of the National Foundation for Infantile Paralysis.

When a chemical was found both effective and safe in these tests, it was tested in humans. For these last stages in the testing program, conscientious objectors and prisoners at federal and state penitentiaries volunteered.

Possibility of developing a vaccine against malaria was explored but has not shown promise.

New knowledge of the malaria parasites themselves and their biochemical requirements has been gained and has aided and probably will further aid the search for chemical cures and preventives of malaria.

Science News Letter, January 12, 1946

• Books of the Week •

ARGENTINA'S AGRICULTURAL EXPORTS DURING WORLD WAR II—Pavel P. Egoroff—*Stanford Univ. Press*, 52 p., charts. 50 cents. War-peace pamphlet No. 8.

CAMBRIAN HISTORY OF THE GRAND CANYON REGION—Edwin D. McKee and Charles E. Resser—*Carnegie Institution*, 232 p., charts and illus., \$2.50 paper, \$3 cloth. Carnegie Institution of Washington publication 563.

THE FUCHSIA BOOK—Alfred Stettler, Ed., *American Fuchsia Society*, 68 p., illus., \$1.50. A collection of articles on the growing of Fuchsias.

THE HEATING OF STEEL—M. H. Mawhinney—*Reinhold*, 265 p., charts and illus., \$4.75. A practical discussion of those features of heating methods and of furnace tools which are important in obtaining the best results from the heating of steel.

HOUSEHOLD MECHANICS—Earl L. Bedell and Ernest G. Gardner—*Int. Textbook*, 241 p., \$2.75. Second ed. Tells everything to know about the thousand and one "fixit" tasks necessary in maintaining a home.

INSIDE THE VACUUM TUBE—John F. Rider—*John R. Rider Publisher*, 407 p., charts and illus., \$4.50. An easy-to-understand presentation of the theory and operation of the basic types tubes.

MEDICAL EDUCATION IN THE UNITED STATES AND CANADA—*American Medical Assn.*, 80 p., tables, 50 cents. Forty-fifth

annual report by the Council on Medical Education and Hospitals.

MINIMUM DESIGN LOADS IN BUILDINGS AND OTHER STRUCTURES—National Bureau of Standards—*American Standards Assn.*, 26 p., charts, 50 cents. Recommended basic building code requirements that are being developed by technical committees under the procedure of the American Standards Assn.

PATHOLOGY IN SURGERY—N. Chandler Foote—*Lippincott*, 511 p., illus., \$10. A textbook; covers the close relationship between the pathologist and the surgeon in the operating room, the surgical ward, and the pathologist's laboratory.

THE SIXTEEN SOVIET REPUBLICS—*Information Bulletin, Embassy of USSR*, 32 p., illus., free. Natural resources, agriculture, population, etc., of each republic.

WOODWORKING FOR EVERYBODY—John Shea and Paul Wenger—*Int. Textbook*, 187 p., illus., \$2.75. An informal, non-technical book on how to make things with wood and how to finish wood.

Science News Letter, January 12, 1946

OPTICS

Rotascope Makes Objects Appear to Stand Still

► WHIRLING airplane propellers appear to stand still when viewed through a new optical instrument developed by scientists of the General Electric Company. It is known as a Rotascope, and is said to be an optical system for untwisting the light of rotating objects before recorded by the human eye.

It is claimed to be the first instrument of its kind which allows a continuous viewing of a rotating object at any particular point in its path of travel. While it eliminates the rotary component of a whirling object's motion, it does not eliminate any flutter or vibration of the moving part. In this is its primary value—by its use scientists are able to make a thorough study of the rotating parts of machinery.

Science News Letter, January 12, 1946

The mango was brought to the western hemisphere, probably from the East Indies, by Portuguese navigators who planted it in Brazil 250 years ago.

NEW BOOKS

OF

LASTING VALUE!

THE CREATIVE MIND

Henri Bergson..... \$3.75

PSYCHOLOGY OF SEEING

Herman F. Brandt..... \$3.75

FIRST ENCOUNTER

John Dos Passos..... \$2.00

ENCYCLOPEDIA OF RELIGION

Vergilius Ferm, ed..... \$10.00

LEGEND OF A MUSICAL CITY

Max Graf..... \$3.00

20TH CENTURY SOCIOLOGY

Georges Gurvitch..... \$6.00

20TH CENTURY PSYCHOLOGY

Philip L. Harriman..... \$5.00

MANAGEMENT OF THE MIND

Milton Harrington..... \$3.00

SOLDIER OF LIBERTY:

CASIMIR PULASKI

Clarence A. Manning..... \$3.00

CRUSHED FOR BETTER WINE

Sara Robbins..... \$2.00

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THOUGHT

Joseph S. Roucek..... \$6.00

ENCYCLOPEDIA OF THE ARTS

Dagobert D. Runes and

H. G. Schrickel, eds..... \$10.00

FAIRY TALES FROM NEAR

AND FAR

Felix Salten..... \$2.50

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Joseph T. Shipley..... \$5.00

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Franz Werfel..... \$3.00

OF LIFE AND LOVE

Emil Ludwig..... \$3.00

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Jacques Maritain..... \$3.00

POPE PIUS XII

Kees Van Hoek..... \$2.00

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Medical science is better equipped today than ever before to prevent trouble above the hair line; or, should some difficulty already have arisen, to deal effectively with it.

"A worthwhile book full of important information."
—Ohio State Medical Journal.

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EMERSON BOOKS, Inc., Dept. 542-C, 251 W. 19th Street, New York 11

• New Machines and Gadgets •

❁ **MAGNETIC** stirring apparatus uses a rotating magnetic force within a housing upon which a laboratory flask may be placed, and a steel magnet enclosed in glass which is placed within the flask containing the liquid to be stirred. In use the magnet in the flask revolves, following the magnetic field.

Science News Letter, January 12, 1946

❁ **IMPROVED** metal sheathing for roofing and sidewalls, known as Plasti-pitch, consists of steel sheets coated with a chemical compound that adheres to the metal under all weather conditions and protects it from rusting and chemical fumes. The elastic coating is not injured by bending.

Science News Letter, January 12, 1946

❁ **GRIPPING DEVICE**, just patented, will hold one or more paint brushes, when not in use, suspended with their bristles in a suitable fluid to keep them soft. It consists of two spring strips of wood at each end. The brush handle is inserted between the strips.

Science News Letter, January 12, 1946

❁ **ELECTRONIC** fuel gauge for airplanes uses the basic principle of a change in the electrical capacity of a condenser when the dielectric changes from liquid to air. It includes a tank unit, which is a simple condenser; a power unit, which contains electric and electronic parts; and a cockpit indicator.

Science News Letter, January 12, 1946



❁ **GLASSES**, to protect eyes in bright daylight for later night vision, look like ordinary sun glasses, as shown in the picture. They prevent temporary night blindness due to excessive exposure to bright sunlight. They transmit only 15% of the visible light and absorb glare and ultraviolet and infrad-red rays.

Science News Letter, January 12, 1946

❁ **ROLL FILM** developing tank takes popular sizes of film and eliminates long

hours in a dark room. It can be loaded in any dark closet and then taken to a lighted room for developing. The tank is made of an acid-resisting plastic.

Science News Letter, January 12, 1946

❁ **ELECTRIC** heater for homes has a rectangular base, and an arched top covered with a grill that extends well down the elongated sides. Cold air enters at the bottom and flows upward over hollow ceramic posts supporting nichrome heater-wires. The heated air passes out through the grill.

Science News Letter, January 12, 1946

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, 1719 N St., N. W., Washington 6, D. C., and ask for Gadget Bulletin 293.

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